EVOLUTIONARY SYSTEMATICS OF *XENYLLA*. XI. SPECIES FROM THE AUSTRALIAN REGION (INSECTA: COLLEMBOLA)

by

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ABSTRACT

GAMA, M.M.da, 1979. Evolutionary systematics of *Xenylla*. XI. Species from the Australian region (Insecta: Collembola). Rec. S. Aust. Mus. 18(5): 123-129.

In some material from all states of Australia the author found twelve *Xenylla* species, one of which—*X. victoriana*, is new. In addition the chaetotaxy of *X. littoralis* from Australia and Japan was studied. The systematics and evolution of some of these taxa are considered.

INTRODUCTION

Following my studies on some *Xenylla* species from Australia, principally from South Australia (Gama 1974), Mrs. Penelope Greenslade of the South Australian Museum, Adelaide, kindly separated out for me the *Xenylla* species from 62 samples which she had assembled from all States of Australia, the Torres Strait Is., Tasmania and New Caledonia. Most of the material had been collected by Mrs. Greenslade herself.

The material contained 12 species, of which one is new, but the most interesting find is, in my opinion, that of *X. littoralis*, which also lives in the littoral zone in Japan.

Mrs. P. Greenslade also sent me the H. Womersley collection of examples of this genus which has been very useful for my study, especially when considering *X. littoralis*.

The material is deposited in the Institutions cited below, whose names have been abbreviated in the text as follows:—

SAM—	South Australian Museum, Adelaide
ANIC—	National Insect Collection, c/o C.S.I.R.O., Division of Entomology, Canberra
MG—	Muséum d'Histoire naturelle de Genève
MC—	Museu Zoológico da Universidade de Coimbra

SYSTEMATICS AND EVOLUTION OF THE SPECIES

1. *Xenylla welchi* Folsom, 1916
Xenylla welchi Folsom, 1916, p. 497.

Material examined—Launceston, Tasmania, in horse manure, garden, very numerous specimens, 9.v.1977. Some specimens in alcohol (SAM); some specimens, in alcohol (ANIC) and some specimens, in alcohol (MC).

2. *Xenylla littoralis* Womersley, 1934
Xenylla littoralis Womersley, 1934, p. 56.

Description—Body length, 1.2-2.1 mm. Blue. Cutaneous granules coarse and third pleurite possessing a lateral conical projection.

Chaetotaxy consisting of supernumerary setae, sometimes very numerous, principally in those specimens with a long body, and often very irregular. Therefore I found it very difficult to determine the chaetotaxic formula of this species.

On the drawing of dorsal chaetotaxy (fig. 1), the dotted line setae represent the most frequent supernumerary setae, but most specimens have many more. Moreover in this species one can distinguish a differentiation into macrochaetae and microchaetae, which is unusual in the genus *Xenylla*.

Dorsal chaetotaxy (fig. 1):

Head: all setae present; L_1 longer than L_3 (character f).

Th.II-III: all setae present and central setae arranged in three rows; there are 2 S.s. on each side, one of which in position P_4.

Abd.I-III: S.s.=P_6; p_5 present.

Abd. IV: S.s.=P_5; p_3 absent (character n). I am not sure whether a_3 is, or is not, present.

Abd. V: all setae present.

Ventral chaetotaxy:

Head: I think that one may consider that all setae are present, although p_1 or m_3 are absent on some specimens (fig. 1 in Gama 1969: 4).

Th.II-III: without setae (character t).

Abd. II: p_1 and p_2 absent (character v) and p_6 also (character w).

Abd. III: without medial setae nor median seta.

Abd. IV: all setae present.

Antenna IV with four sensillae, of which the two most external of the three dorso-external are very long, the ratio between the length of the other two sensillae and the length of these ones being more or less 3:4.

5+5 eyes.

Unguis with inner tooth. Tibiotarsus with two dorsal tenent hairs. Tenaculum with 2+2 barbs. Mucro very long, distinctly separated from dens, which has two setae, tapering to a fine point and

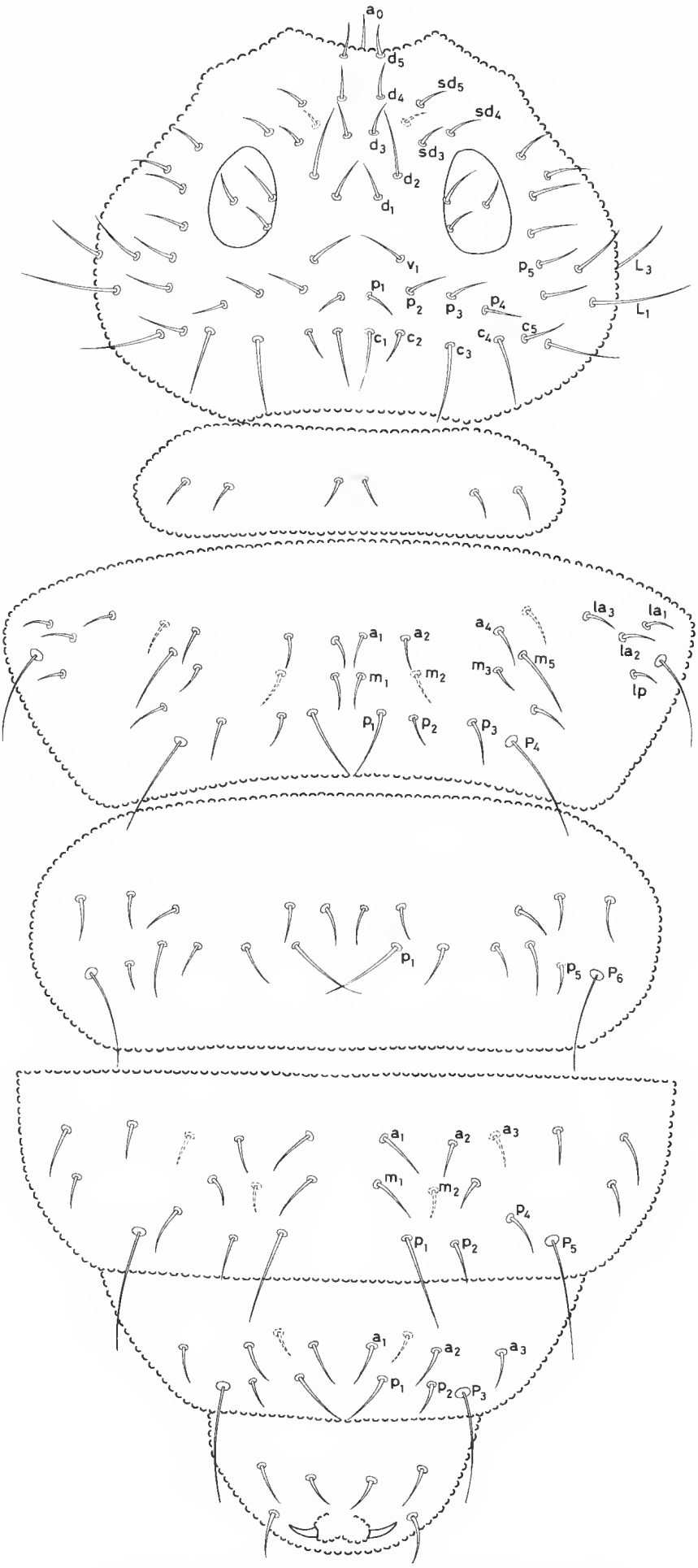

Fig. 1—*Xenylla littoralis*. Dorsal chaetotaxy of head, th. I-II and abd. I, IV, V, VI.

possessing one inner narrow lamella. Mucro more or less equal in length to dens, a little longer or a little shorter (fig. 41-E in Womersley 1939: 93).

Anal spines and papillae very well developed.

Systematics and evolution—When Prof. Yosii, in 1972, sent me one sample of *Xenylla* from Japan (see material examined) he thought that it perhaps belonged to *X. littoralis*, but added that Australia was quite a distance from Japan!

Several times I looked again at this halophilous species, without arriving at any conclusion.

When only some months ago, I had the chance to compare this material and the material cited below with the Womersley collection, and was able to confirm that the Japanese species is identical with *X. littoralis* from Australia, not only in the adaptative characters but also in the chaetotaxic characters (fig. 1).

The examination of three paratypes of *X. arenosa* Uchida and Tamura, 1967, a Japanese species which also lives in the seashore, reveals that it can be separated from *X. littoralis* by some fundamental nonadaptative characters, namely the character b (cephalic setae p_1p_1 absent) although the central setae on th. II-III are arranged in three rows (absence of characters h_1 and h_2) as in *X. littoralis*.

I think that the principal adaptative characters by which the Womersley species is separated from *X. arenosa* are that the former species has two tenent hairs on its tibiotarsus while the latter has only one; furthermore *X. littoralis* possesses anal spines but *X. arenosa* does not; finally *X. littoralis* has a less tapered mucro than *X. arenosa*.

Material examined—South Australia: Yorke Peninsula, Jolly's Beach, 21 mi. E. Sleaford Bay, under stones between tides, 7 specimens, leg. P. Greenslade, 3.ix.1975—1 specimen, on slide (SAM); 1 specimen, on slide (ANIC); 1 specimen, on slide (MG); 4 specimens, on slide (MC); Yorke Peninsula, Royston Head, on beach between tides, 8 specimens, leg. P. Greenslade, 27.i.1976—2 specimens, in alcohol (SAM); 2 specimens, in alcohol (ANIC); 2 specimens, in alcohol (MG); 2 specimens, in alcohol (MC); Christies Beach, 4 specimens, 25.i.1932 (identified by Womersley). Western Australia: Rottnest Island, 1 cotype, 31.i.1931 (identified by Womersley); Marino Rocks, 2 specimens, 25. XII. 1939 (identified by Womersley). Japan: Cape Tachimachi, near Hakodate, Hokkaido, among the debris thrown on the sea shore, 9 specimens, leg. R. Yosii, 5.viii.1971. These specimens are on a slide and in alcohol (MC).

3. *Xenylla thibaudi thibaudi* Massoud, 1965
Xenylla thibaudi Massoud, 1965, p. 374.

Observations—This is the first time that *X. thibaudi thibaudi* has been found in Australia, but it has been already found in New Guinea, the Solomon Islands and the Bismarck Archipelago.

Material examined—Queensland: Cooloola, rain forest litter, 7 specimens, leg. P. Greenslade, 23.ii.1977—in alcohol (MC); Idem, 3 ad. + 3 juv., 16.ii.1977—in alcohol (ANIC); Cooloola, rain forest pitfalls, 2 specimens, leg. P. Greenslade, ii.1977—in alcohol (MG); Cooloola, Warrawonga pitfalls, 2 specimens, leg. P. Greenslade, ii.1977—in alcohol (SAM); Cooloola, Warrawonga leaf litter, 8 specimens, leg. P. Greenslade, 16.ii.1977—in alcohol (MG); Idem, 12 specimens, 23.ii.1977—in alcohol (ANIC); Idem, 40 specimens, 29.iii.1977—in alcohol (MC); Cooloola, Birwillah litter, 12 specimens, leg. P. Greenslade, 16.ii.1977—in alcohol (SAM). New Caledonia: Metzdorf Valley, litter, 5 juv., leg. Gross, 5.i.1966.—in alcohol (MC).

4. *Xenylla yucatana* Mills, 1938
Xenylla yucatana Mills, 1938, p. 183.

Material examined—Torres Strait Islands: Murray Is., litter from vine, bamboo forest, about twenty specimens, leg. Cameron, 17.vii1974—in alcohol (MC); Murray Is., leaf litter, about fifteen specimens, leg. Cameron, 17.vii.1974—in alcohol (SAM).

5. *Xenylla womersleyi* Gama, 1974
Xenylla womersleyi Gama, 1974, p. 81.
Material examined—South Australia: Nuyts Archipelago, Maselon Island, litter from *Westringia* sp., 5 specimens in poor condition, leg. P. Greenslade, 17.i.1977—in alcohol (MC).

6. *Xenylla australiensis australiensis* Gama, 1974
Xenylla australiensis Gama, 1974, p.75.

Synonym—*Xenylla mucronata* Womersley, 1939 *non* Axelson, 1903.

Systematics—The Womersley collection includes other specimens, mounted in slides, named as *X. mucronata*, coming from the You Yang Mountains, Wartook, and also Kenwick (see Womersley 1939: 92).

However, only the specimens cited below could be studied in this work, because the other specimens are not in good condition.

Material examined—Western Australia: Ragged Mountain, 70 mi S Balladonia, near Israelite Bay, litter under *Petrophile* sp, 1 specimen, leg. P. Greenslade, 24.v.1977—in alcohol (SAM).

Victoria: Coranderrk Reserve, Healesville, about fifteen specimens, 27.i.1976—in alcohol (ANIC); Beaufort, Boxer Cutting, in grass, 1 specimen, leg.

P. Greenslade, 12.vi.1975—in alcohol (MG); You Yang Mountains, forest Reserve, from log, 1 specimen, leg. P. Greenslade, 9.vi.1975—in alcohol (MC); You Yang Mountains, 2 specimens, 23.ix.1931 (identified by Womersley as *X. mucronata*); Fish Falls, Wartook, 3 specimens, 30. XII. 1939 (identified by Womersley as *X. mucronata*).

South Australia: Innes National Park, Yorke Peninsula, litter, 35 specimens, leg. P. Greenslade, 2.ii.1974—in alcohol (SAM); Yorke Peninsula, south central, mallee litter, 15 specimens, leg. P. Greenslade, 2.ii.1974—in alcohol (MG); 7 km NW Morgan, *Casuarina* litter, 1 juv., leg. P. Greenslade, 17.xii.1976—in alcohol (ANIC); 7 km NW Morgan, pitfalls, 22 specimens, leg. P. Greenslade, 15-17.xii.1976—in alcohol (MC); near Loxton, mallee leaf litter, 2 specimens, leg. P. Greenslade, 25.ix.1974—in alcohol (SAM); Nuyts Archipelago, Maselon Island, litter under bush, 1 specimen, leg. P. Greenslade, 17.i.1977—in alcohol (ANIC); Belair, 9 specimens, leg. P. Greenslade, 28 iv.1971—in alcohol (MG); Coorong, Coolatoo, disturbance pitfalls, clay pan, in grass, 10 specimens, leg. P. Greenslade, 13.x.1975—in alcohol (MC); Coorong, Coolatoo, disturbance pitfalls, clay pan, in bushes, 6 specimens, leg. P. Greenslade, 28.ix.-13.x.1975—in alcohol (SAM); Mt. Bold, Finniss River, rotten log, about thirty juv., leg. P. Greenslade, 4.v.1975—in alcohol (ANIC); Glenelg River Reserve, *Eucalyptus* leaf litter, 12 juv., leg. P. Greenslade, 18.v.1975—in alcohol (MG); 12 km N of Mt. Gambier, needles under *Pinus radiata* planted 1929, 3 juv., leg. P. Greenslade, 19.v.1975—in alcohol (SAM).

7. *Xenylla greensladeae* Gama, 1974
Xenylla greensladeae Gama, 1974, p. 72.

Systematics—Among the Womersley material there are 4 specimens, on slides, labelled as *X. prisca* n.sp., which as far as I know, has never been described.

I have been able to study two of these specimens which were found to be *X. greensladeae*.

Material examined—Queensland: 15 mi E Killarney, rain forest near Queen Mary Falls, leaf litter, 5 specimens, leg. P. Greenslade, 16.v.1974—in alcohol (SAM); Emu Creek, 20 mi E Warwick, leaf litter, about fifty specimens, leg. P. Greenslade, 14.v.1974—in alcohol (ANIC). Western Australia: Ashburton River, stony flood plain, 5 specimens, leg. P. Greenslade, 22.vi.1975—in alcohol (MG). Australian Capital Territory: Brindabella Range nr. Picadilly Circus, *Eucalyptus* forest leaf letter, numerous specimens, leg. P. Greenslade, 26.vii-i.1972—in alcohol (MC). New South Wales: Dorrigo Run, pitfalls, 1 specimen, leg. Weir, i.1974—in alcohol (SAM). South Australia: Yorke Peninsula, Innes National Park, tall mallee, 9 specimens, leg. P. Greenslade, 14.x.1974—in alcohol (ANIC); Ferries-McDonald Reserve, 3 specimens, leg. E. G. Matthews, 13.x.1977—in alcohol (MG); Belair, in moss, 1 specimen (identified by Womersley as *X. prisca* n.sp.) 26.ix.1943; 7 km NW Morgan, *Casuarina* litter, 4 specimens, leg. P. Greenslade, 17.xii.1976—in alcohol (MC); Idem, 1 juv.—in alcohol (ANIC); Morgan, soil samples, 2 specimens, leg. Butler, 1974—in alcohol (SAM); 7 km NW Morgan, pitfalls, 12 specimens, leg. P. Greenslade, 15-17.xii. 1976—in alcohol (MC); Morgan, under mallee, 35 specimens, leg. Hutson, x.1974—in alcohol (SAM); Coorong, Coolatoo, disturbance traps, clay pan, in grass, 5 specimens, leg. P. Greenslade, 13.x.1975—in alcohol (MC); Coorong, Banff Transect, 35 specimens, leg. P. Greenslade, x.1975—in alcohol (MG), Muston, (Kangaroo Island), in moss, 1 specimen (identified by Womersley as *X. prisca* n.sp.), 23.viii.1943. Victoria: Tarra Falls Valley, in grass, 1 specimen, leg. P. Greenslade, 11.vi.1975—in alcohol (ANIC).

8. *Xenylla maritima* Tullberg, 1869
Xenylla maritima Tullberg, 1869, p.11.

Material examined—South Australia: 75 mi N Mt. Gambier, *Acacia/Casuarina* litter, SAM 325, 16 specimens in poor condition, leg. P. Greenslade, 19.v.1975—in alcohol (SAM); Kiutpo Forest, on dead *Pinus radiata* branches, 10 specimens, leg. P. Greenslade, 20.x.1974—in alcohol (ANIC); Glen Osmond, 3 specimens, iii.1935 (identified by Womersley). Western Australia: Perth, 1 specimen, 23.v.1931 (identified by Womersley). Victoria: Studley Park, 1 specimen, viii.1931 (identified by Womersley).

9. *Xenylla victoriana* n.sp.

Holotype and Paratypes: Victoria—Otway Ranges, fern forest litter, 45 paratypes, leg. P. Greenslade, 8.vi.1975. Holotype, on slide (SAM); 5 paratypes, on slide (MG); 7 paratypes, on slide, and 32 paratypes, in alcohol (MC), Erskin River, *Eucalyptus* woodland, litter and logs, 20 paratypes, leg. P. Greenslade, 8.vi.1975, 16 paratypes, in alcohol (SAM) and 4 paratypes, on slide (MC); Toorangi State Forest, litter and logs, 4 paratypes, leg. P. Greenslade, 10.vi.1975—in alcohol (ANIC); Tara Valley Reserve, falls leaf litter, 3 paratypes, leg. P. Greenslade, 11.vi.1975—in alcohol (MG); Tarra Falls, Wall Valley, in grass, 1 paratype, leg. P Greenslade, 11.vi.1975—on slide (ANIC).

Description

Body length 0·62-0·92 mm. Blue. Cutaneous granules fine. Dorsal chaetotaxy revealing the following characters:

Head: p_1 is absent (character b); L_1 longer than L_3 (character f).

Th.II-III: all setae present, central setae arranged in five rows (characters h_1 and h_2) and with 2 S.s. on each side, one of each in position P_4.

Abd. I-III: S.s.=P_6; p_5 present.

Abd. IV: S.s.=P_5; a_3 present.

Abd. V: S.s.=P_3; a_2 absent (character q).

The characters of ventral chaetotaxy are as follows:

Head: all setae present.

Th. II-III: one seta on each side.

Abd. II: two medial setae.

Abd. III: without medial setae nor median seta.

Abd. IV: m_1 is absent (character a_4); m_2 is absent (character a_5)—This is the first species of *Xenylla* in which I have found character a_5.

Antenna IV with four cylindrical similar sensillae.

5+5 eyes.

Unguis without visible inner tooth. Tibiotarsus with two dorsal tenent hairs. Tenaculum with 3+3 barbs. Mucro with curved apex, possessing an inner lamella and separated from the dens, which has two setae (fig. 2). Length of mucro about one half the length of dens; mucro shorter than claw, the ratio between these two structures is between 3:5 and 3:4.

Anal spines on anal papillae with usual conformation.

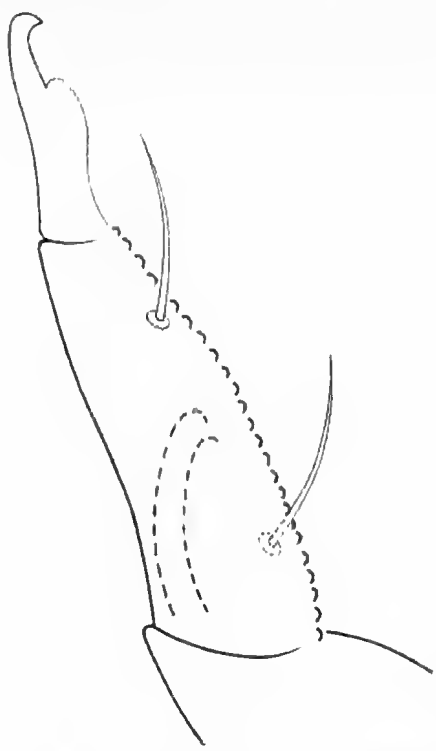

Fig. 2—*X. victoriana* n.sp. Mucrodens in profile.

Systematics and evolution—The new species is genealogically very near to the group *maritima*, *brevisimilis* and *uniseta*, being distinguished essentially from these species by the presence of a_3 on tergite abd. IV and by the absence of m_2 on sternite abd. IV (character a_5—see phylogenetic tree—Fig. 34 in Gama 1969). Moreover, it is the only species I know in which this seta is absent.

X. victoriana n.sp. is further separated from the group *maritima* by the structure of mucrodens, mucro being separated from the dens in the new species, while in the species of this group mucro and dens are fused. Thus, it seems that *X. victoriana* n.sp. is anagenetically more primitive than the species of group *maritima*.

10. *Xenylla grisea* Axelson, 1900
Xenylla grisea Axelson, 1900, p. 108.

Material examined—Queensland: Emu Creek, 20 km E Warwick, rotten log, 3 specimens, leg. P. Greenslade, 14.v.1974—in alcohol (MC). South Australia: Adelaide, 4 specimens, v.1933 (identified by Womersley as *X. maritima*).

11. *Xenylla stachi wolffi* Gama, 1967
Xenylla stachi wolffi Gama, 1967, p. 15.

Observations—This subspecies is found in the Solomon Islands and in the New Hebrides. This is the first time it has been found in Australia.

Material examined—Queensland: Cooloola, rain forest litter, 2 specimens, leg. P. Greenslade, 23.ii.1977—in alcohol (MC): Cooloola, Warrawonga pitfalls, 1 juv., leg. P. Greenslade, ii.1977—in alcohol (SAM); Cooloola, Warrawonga litter, 1 specimen, leg. P. Greenslade, 29.iii.1977—in alcohol (MC): Cooloola, Chalambar pitfalls, 2 specimens, leg. P. Greenslade, ii.1977—in alcohol (MC): Cooloola, Chalambar litter, about thirty specimens, leg. P. Greenslade, 23.ii.1977—in alcohol (ANIC): Cooloola, Birwillah litter, 2 specimens, leg. P. Greenslade, 16.ii.1977—in alcohol (SAM); Cooloola, Pertaringa litter, about fifteen specimens, leg. P. Greenslade, 23.ii.1977—in alcohol (MG): Idem, about thirty specimens, 29.iii.1977, 23 specimens, in alcohol (SAM); 7 specimens, on slide (MC). Northern Territory: Alice Springs, Kunoth Paddock, hills litter, 2 specimens, leg. P. Greenslade, 17.ii.1975—on slide (MC). Torres Strait Islands: Murray Is., litter from vine, bamboo forest, about twenty specimens, leg. Cameron, 17.vii.1974, 8 specimens, on slide and the other specimens, in alcohol (MC).

12. *Xenylla* cf. *obscura* Imms, 1912
Xenylla obscura Imms, 1912, p. 84.

Systematics and evolution—The populations cited below from Australia and New Caledonia are

distinguished from the populations of *X. obscura* from Sikkim, Nepal and India (for a redescription see Gama 1969: 43-46) in the following features:—

1. The tip of the mucro is wider than on the drawing represented in fig. 28.

2. The cephalic setae L_1 and L_3 are more or less similar in length (absence of character f).

3. The cephalic seta a_0 is present in some populations, but is absent in others, although within a population some variability of this character, a, may be observed.

4. Setae are in general blunt and not sharp as in the other populations of *X. obscura* which I have previously studied (Gama 1969 and 1971).

These populations that present the character, a, could possibly be considered as *X. hawaiiensis* Gama, 1969, because they are placed in the same cladogenetic level as this species (fig. 34 in Gama 1969). However, in typical specimens of the species from the Hawaii Islands the mucro is different in form (fig. 30: 51 in Gama 1969) from the mucro found in populations from Australian regions.

In 1971 (Gama 1971: 152-153) I verified, after studying some populations of *X. obscura* from Nepal, that "a greater length of the body and a greater development of anal spines seems to be correlated with the absence of a_3 on abd. IV and the greater length of L_1 in comparison with L_3. A similar correlation appears to occur between a shorter body and a lesser development of anal spines and the presence of a_3 on abd. IV and the near similarity of length of L_1 and L_3". (The above is English rendering of the original French).

However, these populations from Australia and New Caledonia do not have the seta a_3 on tergite abd. IV and the anal spines are relatively poorly developed. In body length, specimens from New Caledonia are very long whilst those from Australia are relatively short.

I have also recently examined further specimens from Nepal which Prof. Cassagnau has kindly sent me. In the four populations of *X. obscura* that I have studied, the mucro presents the characteristic form of the species, the setae are sharp, L_1 is longer than L_3 (character f), the cephalic seta a_0 is present (absence of character a), and the seta a_3 on tergite abd. IV is absent. Anal spines are only well developed in sample n^0 65.

Material examined—Queensland: Cooloola, Kabali East litter, pitfall traps, 2 specimens, leg. P. Greenslade, ii.1977—on slide (MC); Cooloola, Chalambar pitfalls, 1 specimen, leg. P. Greenslade, ii.1977—in alcohol (MC). Northern Territory: Alice Springs, Kunoth Paddock, ungroved Mulga litter, 2 ad. + 4 juv., leg. P. Greenslade, 7.ii.1975—in alcohol (ANIC); Idem, about fifty specimens, 15.ii.1975—in alcohol (SAM); Idem, 5 specimens, 15.ii.1975—in alcohol (MG); Alice Springs, Kunoth Paddock, grove Mulga litter, 8 specimens, leg. P. Greenslade, 15.ii.1975—on slide (MC); Alice Springs, Kunoth Paddock, hills litter, numerous specimens, leg. P. Greenslade, x.1974—on slides and in alcohol (MC); Idem, 40 specimens, leg. P. Greenslade, 17.ii. 1975, 34 specimens, in alcohol (ANIC), 6 specimens, on slide (MC). South Australia: Monarto South, Ferries-McDonald Reserve, in *Lepidosperma*, 15 specimens, leg. P. Greenslade, 2.x.1977—in alcohol (MG); near Loxton, mallee leaf litter, 25 specimens, leg. P. Greenslade, 25.ix.1974—in alcohol (SAM). New Caledonia: Île Nou, on the surface of a puddle of water, very numerous specimens, leg. G. Fabres, 28.xii.1977. sent by Prof. P. Cassagnau—on slide and in alcohol (MC).

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I also thank sincerely Prof. H. Uchida, Prof. S. Chiba and Dr. H. Tamura, who kindly provided some types of *X. arenosa* Uchida and Tamura, 1967, the study of which led me to conclude that this species from the Japanese littoral is not *X. littoralis*.

Finally I am particularly grateful to Mrs. P. Greenslade for giving me the opportunity to get to know the Australian *Xenylla* species.

I should like to thank Dr. M. Tully for help in the translation of this article.

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